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ABSTRACT

The success with which freshmen cumulative point averages may be predicted from a combination of a student's high school rank, Scholastic Aptitude Test (SAT) score (Verbal) and SAT score (Mathematics) was investigated. A multiple regression formula developed by the College Entrance Examination Board was used to combine the three predictors into a cumulative point average. Product moment correlation coefficients were computed for both males and females using the three factors and high school rank alone by comparing predicted averages to actual averages for the academic year 1973-1974. Correlation coefficients ranged from a high of .74 to a low of .44. (Author/RC)

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A COMPARATIVE STUDY OF THE COLLEGE ENTRANCE EXAMINATION BOARD VALIDITY STUDY SERVICE AND FRESHMEN CUMULATIVE POINT AVERAGES

APPLIED EDUCATIONAL RESEARCH AND EVALUATION

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A PRACTICUM PRESENTED TO NOVA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

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ABSTRACT

The present study was concerned with the investigation of the success with which freshmen cumulative point averages may be predicted from a combination of a student's high school rank, Scholastic Aptitude Test Score - Verbal and Scholastic Aptitude Test Score - Mathematics.

A multiple regression formula developed by the College Entrance Examination was used to combine the three predictors into a cumulative point average.

Product moment correlation coefficients were computed for both males and females using the three factors and high school rank alone by comparing predicted averages to actual averages for the academic year 1973-1974.

Correlation coefficients ranged from a high of .74 to a low of .44.

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TITLE

A Comparative Study of the College Entrance Examination Board Validity Study Service and Freshman cumulative Point Averages.

STATEMENT OF THE PROBLEM

The problem concerns the accuracy of the multiple regression formula developed by the College Entrance Examination Board. From a combination of a student's high school rank, Scholastic Aptitude Test Score - Verbal and Scholastic aptitude Test Score - Mathematical a predicted cumulative point average may be computed for a student.

The multiple regression formula was developed by the College Entrance Examination Board from statistics of the 1971-1972 freshman class at Johnson & Wales College. The formula weights the SAT Mathematics Score about two and one-half times the SAT Verbal Score. High school rank receives about three and one-half times as much weight as the SAT Verbal Score. In essence, the students high school rank receives approximately one-half the weight in the regression formula.

To illustrate the use of the regression formula assume the following facts about student X:

High school rank - 5 out of 100

SAT - Verbal - 473

SAT - Math. - 529

In order to determine the predicted cumulative point average the high school rank, SAT - Verbal and SAT - Math. must be converted into a weighted value. The College Entrance Examination Board has provided a Computational Aid which allows participating institutions to calculate predicted averages without the time consuming calculations. A copy of this Computational Aid is included in the Appendix. The Computational Aid automatically converts raw scores into weighted scores.

RAW SCORES	WEIGHTED SCORES
High School Rank - 5/100	1.354
SAT Verbal - 473	.550
SAT Math. - 529	1.454
PREDICTED CUMULATIVE AVERAGE . .	3.359 or 3.4

For those students without SAT Scores a Computational Aid has again been developed whereby a students High School Rank may be converted directly into a predicted cumulative point average. A copy of this Computational Aid also appears in the Appendix.

The admissions department of Johnson & Wales College has used the multiple regression formula in selected instances only. No attempt has been make to apply the predictions to the entire freshman class. It is evident that the Validity Study Service has not been utilized to the fullest extent possible.

One reason for this lack of utilization appears to be the doubt over the precision which the regression formula has in predicting cumulative point averages.

NULL HYPOTHESIS

With the preceeding thoughts in mind, the purpose of this research study will be to prove that. . . . .

there is no significant difference between the College Entrance Examination Board Validity Study Service predicted freshman cumulative point averages and the actual cumulative point averages for the 1973 freshman class at Johnson & Wales College.

The alternate hypothesis may be stated as follows:

There is a significant difference between the College Entrance Examination Board Validity Study Service predicted freshman cumulative point averages and the actual cumulative point averages for the 1973 freshman class at Johnson & Wales College.

BACKGROUND AND SIGNIFICANCE

The literature in the field of education relating to the prediction of student grades was reviewed for research relating to the present study. A list of studies was compiled and reviewed in order to justify the present study.

Two primary studies were found which are related to the prediction of student grades.

Perry, Josyln and Swanson (1968) studied all Minnesota high school students who entered the University of Minnesota in the fall of 1968. Three predictors were used to ascertain the freshman cumulative point averages:

(1) High school rank

(2) Minnesota Scholastic Aptitude Test Score

(3) National ACT and SAT Scores

The results of the study indicated that grades of women are generally more predictable than those of men. Also, high school rank was found to be the best single predictor of cumulative point averages. The overall results of the validity analysis indicated that despite a slight decline in the predictability of grades in the state colleges and junior colleges, high school rank, Minnesota Scholastic Aptitude Test Score, ACT Test Score and SAT Scores continue to be valid predictors of college grades and can, therefore, serve as useful aids for both colleges and students in reaching decisions about college entrance.

Reilly (1971) studied various transcript informatior with respect to grades achieved in law school. The basic variables selected included:

(1) Law School Aptitude Test;

(2) Writing Analysis Test;

(3) Undergraduate Cumulative Point Average.

The results of the study lead to the conclusion that the Law School Admission Test proved to be the best single predictor of freshman cumulative point averages.

A number of studies have been conducted by the Educational Testing Service in connection with validity services rendered to various professional institutions. The most notable, conducted by Barbara Pitcher (1972), concerned previous validity studies carried out by the Educational Testing Service for various graduate schools of business between the years 1954 and 1970. The study compared first year cumulative averages and the following predictors:

(1) Aptitude Test for Graduate Study in Business Scores - Total.

(2) Undergraduate record.

The results of the study indicated that test scores and grade point averages used in all of the previous studies are effective predictors for full-time students but less effective for part-time students. Also, the Aptitude Test for Graduate Study in Business - Quantitative Score appears to be a more effective predictor than the Verbal Score.

DEFINITION OF TERMS

The following terms will be used consistently throughout the study:

(1) HSR - student high school rank

(2) QPA - student cumulative point average

(3) SAT - V - Scholastic Aptitude Test Score - Verbal

(4) SAT - M - Scholastic Aptitude Test Score - Mathematics

(5) Validity Study - the process undertaken by the College Entrance Examination Board whereby grades for the 1971 freshman class were submitted along with each students HRS, SAT - V, and SAT -M. The analysis provided the regression formula used to predict grades in the present study.

LIMITATIONS OF THE STUDY

The study is solely concerned with the predicted averages and actual averages for the 1973 freshman class of Johnson & Wales College. The regression formula used to predict the averages was developed from an analysis of data concerning Johnson & Wales students. The formula should not be applied to students from other institutions unless a similiar validity study is undertaken. Also, the results of the study will be applicable to the students of Johnson & Wales and should not infer the degree of predictability of other regression formulas in use in other institutions.

PROCEDURES FOR COLLECTING DATA

The 1973 freshman class of Johnson & Wales College totaled approximately two hundrud and seventy students. Based on the multiple regression formula developed by the College Entrance Examination Board, predicted cumulative point averages were computed for each student in one of two methods:

(1) using HSR; SAT - V: SAT - M;

(2) using HSR only.

Following the prediction of the cumulative point averages each studnets actual cumulative point average for the academic year 1973-1974 was inserted next to the predictor. A copy of the instrument used to compile this information is contained in the Appendix.

PROCEDURES FOR TREATING DATA

In order to test the null hypothesis a twofold statistical analysis was employed. First, a Pearson Product-Moment Correlation Coefficient was computed by comparing predicted cumulative point averages to the actual cumulative point averages. The following formula was used to compute the correlation coefficient:

$$R_{xy} = \frac{N\,xy - (x)\,(y)}{\sqrt{(N\,x^2 - (x)^2)\,(N\,y^2 - (y)^2)}}$$

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1. Harshbarger, Thad R. Introductory Statistics: A Decision Map. New York: Macmillan Co., 1971. p. 328

Correlation coefficients were computed for the following comparisons:

(1) all students using HSR, SAT - V and SAT - M;

(2) all students using HSR only;

(3) males only using HSR, SAT - V, SAT - M;

(4) females only using HSR, SAT - V, SAT -M;

(5) males only using HSR only;

(6) females only using HSR only;

Populations and sample percentage appear below:

COMPARISON	POPULATION	SAMPLE (%)
1.	124	17 (15)
2.	90	18 (20)
3.	57	19 (33)
4.	60	20 (33)
5.	32	16 (50)
6.	45	15 (33)

DATA RESULTING FROM STUDY

Table 1. represents a sample of all freshmen students using three predictors to calculate the predicted cumulative point average. The correlation coefficient was determined to be .71. Mean and standard deviation are also shown in the analysis. The computed T value was .488 which was highly significant at the .05 level.

Table 1: COMPARISON OF PREDICTED QPA AND ACTUAL QPA FOR ALL STUDENTS USING HIGH SCHOOL RANK, SAT - VERBAL AND SAT - MATHEMATICS.

STUDENT NO.	PREDICTED QPA (X)	ACTUAL QPA (Y)
1.	1.89	1.69
2.	1.82	1.12
3.	3.26	3.85
4.	2.55	2.39
5.	2.06	3.03
6.	2.21	1.56
7.	3.22	3.28
8.	3.03	3.00
9.	2.44	1.85
10.	2.33	3.88
11.	2.67	2.03
12.	2.09	2.84
13.	2.34	2.19
14.	3.01	3.61
15.	2.99	3.66
16	1.99	1.76
17.	3.08	3.38
TOTALS	42.98	45.12
MEAN	2.53	2.65
STANDARD DEVIATION	.49	.89

N = 124 CORRELATION COEFFICIENT = .71

Predicted cumulative point averages, using high school rank as the lone predictor, actual cumulative point averages for all students are presented in Table 2. The computed correlation coefficient of this comparison was .55. The computed T value was .444, which was found to be significant at the .05 level.

Table 2: COMPARISON OF PREDICTED QPA AND ACTUAL QPA FOR ALL STUDENTS USING HIGH SCHOOL RANK AS THE LONE PREDICTOR.

STUDENT NO.	PREDICTED QPA (X)	ACTUAL QPA (Y)
1.	2.66	2.07
2.	2.82	3.85
3.	2.66	1.47
4.	1.55	2.69
5.	2.66	2.68
6.	1.71	1.48
7.	2.35	2.40
8.	2.19	1.15
9.	3.14	2.97
10.	2.03	2.56
11.	2.66	2.75
12.	2.19	2.56
13.	2.66	3.27
14.	2.35	3.43
15.	2.66	2.67
16.	2.35	3.33
17.	2.19	2.63
18.	2.03	0.60
TOTALS	42.86	44,57
MEAN	2.38	2.48
STANDARD DEVIATION	.40	.84

N = 90 CORRELATION COEFFICIENT = .55

When the predicted and actual cumulative point averages for males were compared a correlation coefficient of .44 was found. The computed T value was .82, which was significant at the .05 level (Figure 3).

TABLE 3: COMPARISON OF PREDICTED QPA FOR MALES, USING HSR, SAT AND SAT - M AS PREDICTORS, AND ACTUAL QPA.

STUDENT NO.	PREDICTED QPA (Y)	ACTUAL QPA (X)
1.	2.20	2.09
2.	1.79	1.56
3.	1.99	2.06
4.	1.99	2.61
5.	1.58	1.33
6.	2.55	2.39
7.	2.11	3.00
8.	2.14	2.79
9.	2.21	1.56
10.	1.55	2.03
11.	1.95	2.38
12.	1.99	0.72
13.	2.21	2.19
14.	1.97	3.45
15.	3.01	3.61
16.	1.94	2.03
17.	2.01	2.15
18.	2.39	1.88
19.	2.16	2.39
TOTALS	39.74	42,32
MEAN	2.09	2.23
STANDARD DEVIATION	.33	.70

N = 57 CORRELATION COEFFICIENT - .44

The same analysis employed for male students in Figure 3 was employed for females in Table 4. For females the correlation coefficient was .65. A T value of 2.72 was found but was not significant at the .05 level.

Table 4: COMPARISON OF PREDICTED QPA AND ACTUAL QPA FOR FEMALES, USING HSR, SAT-V AND SAT-M.

STUDENT NO.	PREDICTED QPA (X)	ACTUAL QPA (Y)
1.	2.25	2.72
2.	2.91	3.47
3.	2.67	2.94
4.	2.94	2.71
5.	2.06	3.03
6.	2.68	3.42
7.	2.85	2.58
8.	2.68	2.59
9.	3.51	4.00
10.	2.44	2.38
11.	2.67	3.52
12.	1.73	1.64
13.	2.19	2.57
14	2.09	2.84
15.	1.82	2.93
16.	2.08	3.11
17.	2.43	3.23
18.	1.86	2.00
19.	2.46	3.21
20.	3.08	3.38
TOTALS	49.40	58.27
MEAN	2.47	2.91
STANDARD DEVIATION	.47	.55

N = 60 CORRELATION COEFFICIENT = .65

Figures five and six compare predicted and actual cumulative point averages for males and females using High School Rank as the lone predictor. For the males a correlation coeficient of .74 was obtained. The computed T value was .941, which was highly significant at the .05 level.

The analysis for females revealed a .70 correlation coefficient. The T value computed was .763, which was significant at the .05 level.

Table 5: COMPARISON OF PREDICTED QPA AND ACTUAL QPA FOR MALES USING HSR ONLY AS PREDICTOR.

STUDENT NO.	PREDICTED QPA (X)	ACTUAL QPA (Y)
1.	2.66	2.07
2.	3.40	3.82
3.	2.35	2.25
4.	2.19	1.58
5.	2.03	0.59
6.	2.19	2.15
7.	2.35	3.23
8.	2.19	1.15
9.	3.14	2.97
10.	2.35	3.00
11.	2.82	2.20
12.	1.55	1.09
13.	2.66	3.27
14.	2.03	1.19
15.	2.35	1.61
16.	2.03	2.17
TOTALS	38.19	34.34
MEAN	2.39	2.15
STANDARD DEVIATION	.44	.92

N = 32 CORRELATION COEFFICIENT = .74

Table 6: COMPARISON OF PREDICTED QPA AND ACTUAL QPA FOR FEMALES USING HSR ONLY AS RREDICTOR.

STUDENT NO.	PREDICTED QPA (X)	ACTUAL QPA (Y)
1.	2.35	2.25
2.	2.66	2.59
3.	3.14	3.84
4.	2.98	3.68
5.	2.66	2.68
6.	2.82	1.79
7.	2.50	3.82
8.	2.03	1.13
9.	2.50	3.29
10.	2.66	2.75
11.	1.87	2.81
12.	1.55	0.65
13.	2.98	4.00
14.	2.66	2.47
15.	2.19	2.39
Totals	37.55	40.64
MEAN	2.50	2.71
STANDARD DEVIATION	.44	.97
N = 45		CORRELATION COEFFICIENT = .70

SIGNIFICANCE OF DATA

A summary of correlation coeficients and mean cumulative point averages appears in Table 7. The highest correlation appears in the analysis of predicted and actual grades for males using HSR as the lone predictor. The lowest correlation appeared for males again. This time three predictors, HSR, SAT - V and SAT - M were the least effective in predicting cumulative point averages.

It is interesting to note that in all but one comparison the actual cumulative point average was higher than the predicted average. The only comparison in which the predicted cumulative average was higher than the actual average also had the highest correlation coefficient.

Only one comparison resulted in a significant difference in mean cumulative point averages. This comparison was for females using all three predictors. The predicted average was computed at 2.47 while the actual average was 2.91.

Based on the preceeding comments and the statistical analysis employed there has been a failure to reject the null hypothesis that.....

there is no significant difference between the College Entrance Examination Board Validity Study Service predicted freshman cumulative point averages and the actual cumulative point averages for the 1973 freshman class at Johnson & Wales College.

Table 7: SUMMARY OF CORRELATION COEFFICIENTS AND MEAN CUMULATIVE POINT AVERAGES.

PREDICTOR(S)	STUDENTS	CORRELATION COEFFICIENT	MEAN PREDICTED	ACTUAL
HSR, SAT - V, SAT - M	ALL	.71	2.53	2.65
HSR	All	.55	2.38	2.48
HSR, SAT -V, SAT-M	Males	.44	2.09	2.23
HSR, SAT-V SAT-M	Females	.65	2.47	2.9
HSR	Males	.74	2.39	2.15
HSR	Females	.70	2.50	2.71

RECOMMENDATIONS

At the present time grade predictions using the Validity Study Service are not applied to all incoming students. The admissions department of the college has used the predictors in selected cases for a variety of reasons. There has been no attempt to apply the formula to an entire incoming class.

It appears that the prediction of cumulative point averages could serve many purposes:

(1) counseling students upon entrance;

(2) helping students to select curricula;

(3) aiding the admissions department in filling student quotas;

(4) motivation to enrolled students to strive for greater excellence.

One such use of the Validity Study Service is the present practice of computing predicted cumulative point averages upon request of incoming students. A sample of the request form and reply are contained in the Appendix.

It is recommended that all freshmen students be made aware of the Validity Study Service. A request form and an explanation of the service could be made available during orientation week with registration materials. In this way all students would have the opportunity to see their predicted cumulative averages.

SUGGESTIONS FOR FURTHER STUDY

The results of the correlation computations indicate a range of coefficients from .44 to .74. They fall into the categories of moderate and high. It would be interesting to know the backgrounds of the students selected in each sample in order to draw conclusions concerning the differences between predicted and actual cumulative point averages.

Future studies could possibly focus on individual factors such as:

(1) IQ;

(2) Socioeconomic status;

(3) Age;

(4) Race;

(5) High school grades.

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